

Cycling WebQuest Spring '09:

Directions: Visit the following websites and answer the related questions. Your goal is to gain a better understanding of the carbon and nitrogen cycles. You have studied the water cycle in previous science courses so we don't concentrate on it in Env. Sci. That doesn't mean that it won't be mentioned as a part of the two cycles we do study.

Background: In biogeochemical cycles (including carbon, water and nitrogen cycles), elements are transported between the atmosphere, biosphere (living things), hydrosphere (water), and geosphere (rocks, minerals, and soils). These cycles help us remember that Earth is a complex system.

Carbon Cycle:

Go to http://www.windows.ucar.edu/tour/link=/earth/Water/co2_cycle.html and answer these questions:

1. Draw the carbon cycle:

2. How does carbon exist in the atmosphere?

3. How are fossil fuels created?

4. Describe two ways that carbon enters the atmosphere.

5. How are the oceans involved in the carbon cycle?

6. How is the temperature of the Earth partly controlled by carbon?

7. What role do rocks have within the carbon cycle?

Go to http://www.windows.ucar.edu/earth/climate/carbon_cycle.html to play the carbon cycle game. You are a carbon atom!

8. Where are you starting within the carbon cycle?

“Click to begin your journey”

9. How much of the atmosphere is made of carbon dioxide (CO₂)?

10. By how much has CO₂ increased in the atmosphere during the past 150 years?

As you work through this game, take some notes about where you go as a carbon atom. Make sure you visit all reservoirs!

11. Next stop = _____
What did you learn?

The deep ocean accounts for more than _____ % of the Earth's carbon.

12. Next stop = _____
What did you learn?

How much carbon does the surface ocean absorb from the atmosphere each year?

True or False:
When plants die and decay, they bring carbon into soil.

13. Next stop = _____
What did you learn?

True or False:
Plants both absorb
CO₂ from the
atmosphere and
release it into the
atmosphere.

14. Next stop = _____
What did you learn?

True or False:
Phytoplankton are
tiny plants and
algae that float in
the ocean and take
up carbon dioxide
as they grow.

15. Next stop = _____
What did you learn?

When carbon
enters the deep
ocean, how long
does it stay there?

Nitrogen Cycle:

Go to

<http://www.elmhurst.edu/~chm/onlcourse/chm110/outlines/nitrogencycle.html>

and answer these questions.

16. What are the two conditions under which nitrogen will react with oxygen? (In other words, what is necessary for nitrogen in the air to combine with oxygen?)

17. What are the two compounds that are formed when nitrogen combines with oxygen?

18. How does nitric acid (HNO₃) form?

19. Why is nitric acid (HNO₃) important?

Go to:

<http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/N/NitrogenCycle.html> and answer these questions.

20. What percentage of the air we breathe is nitrogen?

21. Even though considerable nitrogen is available in the air, most plants do not use the nitrogen (N_2) found in the air. Why not?

22. In what compounds can plants use nitrogen?

23. How do animals get the nitrogen they need?

24. Atmospheric nitrogen (N_2) is pretty inert. This means that it does not easily break apart. When molecules do not break apart easily, it is difficult (or impossible) for organisms to use them as a nutrient source. As a result, **nitrogen fixation** is the term used to describe the process of breaking up N_2 .
 - a. What is atmospheric fixation?

 - b. What is industrial fixation? [This is how artificial fertilizers are made.]

 - c. What is biological fixation? (In your answer, describe the types of plants associated with the symbiotic relationship.)

Go to: <http://www.physicalgeography.net/fundamentals/9s.html> and answer these questions.

25. Draw the nitrogen cycle. (Remember there are other diagrams on the previous websites.) If you're not sure what a term means, look through the reading and links for help.

26. Why is nitrogen needed by plants and animals?